

Notice of Allowability

Application No.

10/716,729

Examiner

RAKESH K. DHINGRA

Applicant(s)

BRCKA, JOZEF

Art Unit

1792

- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to After Final Amendment dt. 04/23/08.
2. ☒ The allowed claim(s) is/are 4,6 and 9.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO/SB/08),
Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application
6. ☒ Interview Summary (PTO-413),
Paper No./Mail Date 4/30/08.
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

/Rakesh K Dhingra/
Examiner, Art Unit 1792

EXAMINER'S AMENDMENT

An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Joseph R. Jordon on 4/30/08.

The application has been amended as follows:

In the claims

4. (Currently Amended) An ICP source for a semiconductor wafer plasma processing apparatus comprising The ICP source of claim 1 wherein: an RF generator; a series RF circuit that includes a substrate support and a peripheral ionization source, including at least one inductive element that generates an RF magnetic field into a plasma, connected to and surrounding the substrate support on the periphery of the substrate support, the substrate support and the peripheral ionization source forming a common planar surface having a substrate support surface at its center; a matching network coupling the RF generator into the series RF circuit; the RF generator coupling RF energy to the series RF circuit to bias the substrate support surface to capacitively couple to the plasma proximate the planar surface and to energize the peripheral ionization source to inductively couple to the plasma proximate the planar surface, thereby forming a high density plasma across the planar surface by both capacitively and inductively coupling energy thereto from the series RF circuit; and a slotted Faraday shield between the inductive element and the plasma for facilitating the inductive coupling of energy from the inductive element into the plasma and for limiting the capacitive coupling of energy from the inductive element to the plasma, wherein the peripheral ionization source includes an annular antenna that surrounds the substrate support

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surface and is capacitively-coupled in series with the substrate support surface to form the RF series circuit [.]; and

wherein the RF generator is connected to the substrate support through the matching network.

6. (Currently Amended) An ICP source for a semiconductor wafer plasma processing apparatus comprising The ICP source of claim 1 wherein: an RF generator; a series RF circuit that includes a substrate support and a peripheral ionization source, including at least one inductive element that generates an RF magnetic field into a plasma, connected to and surrounding the substrate support on the periphery of the substrate support, the substrate support and the peripheral ionization source forming a common planar surface having a substrate support surface at its center; a matching network coupling the RF generator into the series RF circuit; the RF generator coupling RF energy to the series RF circuit to bias the substrate support surface to capacitively couple to the plasma proximate the planar surface and to energize the peripheral ionization source to inductively couple to the plasma proximate the planar surface, thereby forming a high density plasma across the planar surface by both capacitively and inductively coupling energy thereto from the series RF circuit; and a slotted Faraday shield between the inductive element and the plasma for facilitating the inductive coupling of energy from the inductive element into the plasma and for limiting the capacitive coupling of energy from the inductive element to the plasma, wherein the matching network is capacitively-coupled to the substrate support surface, ~~and~~ wherein the peripheral ionization source is capacitively-coupled to the substrate support surface and is capacitively-coupled to the chamber ground [.]; and

wherein the RF generator is connected to the substrate support through the matching network.

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9. (Currently Amended) An ICP source for a semiconductor wafer plasma processing apparatus comprising The ICP source of claim 1 wherein: an RF generator; a series RF circuit that includes a substrate support and a peripheral ionization source, including at least one inductive element that generates an RF magnetic field into a plasma, connected to and surrounding the substrate support on the periphery of the substrate support, the substrate support and the peripheral ionization source forming a common planar surface having a substrate support surface at its center; a matching network coupling the RF generator into the series RF circuit; the RF generator coupling RF energy to the series RF circuit to bias the substrate support surface to capacitively couple to the plasma proximate the planar surface and to energize the peripheral ionization source to inductively couple to the plasma proximate the planar surface, thereby forming a high density plasma across the planar surface by both capacitively and inductively coupling energy thereto from the series RF circuit; and a slotted Faraday shield between the inductive element and the plasma for facilitating the inductive coupling of energy from the inductive element into the plasma and for limiting the capacitive coupling of energy from the inductive element to the plasma, wherein the peripheral ionization source is capacitively-coupled to the substrate support surface, wherein the RF generator is connected to the substrate support through the matching network; and wherein the matching network has impedances in series with the peripheral ionization source that are approximately tuned to the frequency of the RF generator.

Allowable Subject Matter

Claims 4, 6 and 9 allowed.

Reasons for Allowance

The following is an examiner's statement of reasons for allowance:

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Claims 4, 6, 9 – Closest prior arts [(Roderick – US 6,353,206), (Moslehi et al – US 6,471,830) and (Denda et al – 6,440,260)] do not teach claim limitation “wherein the peripheral ionization source is capacitively-coupled with the substrate support surface and wherein the RF generator is connected to the substrate support through the matching network” in the context of remaining limitations of the claim. Further, Ishizuka et al (US 5,531,834) teach a plasma apparatus (Fig. 17) comprising a top coil 13 connected to a RF source 42 through a matching network 41 and where the RF source 42 could be connected to chamber 1 or susceptor 2 (col. 12, line 1 to col.15, line 15). Ishizuka et al do not teach claim limitation “wherein the peripheral ionization source is capacitively-coupled with the substrate support surface and wherein the RF generator is connected to the substrate support through the matching network” in the context of remaining limitations of the claim.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled “Comments on Statement of Reasons for Allowance.”

Any inquiry concerning this communication or earlier communications from the examiner should be directed to RAKESH K. DHINGRA whose telephone number is (571)272-5959. The examiner can normally be reached on 8:30 -6:00 (Monday - Friday).

If attempts to reach the examiner by telephone are unsuccessful, the examiner’s supervisor, Parviz Hassanzadeh can be reached on (571)-272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Rakesh K Dhingra/
Examiner, Art Unit 1792

/Parviz Hassanzadeh/
Supervisory Patent Examiner, Art Unit 1792